STATE OF CALIFORNIA
DEPARTMENT OF FISH AND GAME

AQUATIC TOXICOLOGY LABORATORY REPORT

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Elk Grove, CA 95624

Lab No: P-2161-1
E.P. No:
Index: K112 PCA: E2770

Date Received: 03/15/99
ATL: S102400-1

To: Kean Goh

Address: Department of Pesticide Regulation
Environmental Monitoring Branch
830 K Street
Sacramento, CA. 95814-3510

Report Date: 11/14/00

Remarks
The Department of Fish and Game's Aquatic Toxicology Laboratory staff tested Bifenthrin with *Pimephales promelas* in an acute definitive test. The purpose of the test was to find the LC50 value for Bifenthrin to *Pimephales promelas*. The toxicity test was conducted following ASTM and the general guidelines of EPA/600/4-90/027F.

RESULTS OF EXAMINATION

Water Quality Parameters
Water samples were analyzed for conductivity, temperature, pH, dissolved oxygen, total alkalinity, and total hardness (Table 1).

Conclusion
The control survival was 98%. Solvent control survival was 100%. Survival in concentration 0.56 ppb was 83%. There was a statistically significant difference between the survival in the control and in concentrations 1.09 ppb, 2.40 ppb, 5.10 ppb , 7.40 ppb and 9.18 ppb. The LC50 (95% CL): 0.78 (0.526-0.853) ppb based on linear interpolation method.

Toxicity Test Report

I. Test Number 86-00

II. Investigator: Donald Guy Title: Fish and Wildlife Technician

III. Test Dates 7/5/00-7/9/00

Duration 96 hours

A. Load Organisms 7/5/00

B. Began Test 7/5/00

C. Ended Test 7/9/00

IV. Toxicants: Bifenthrin

A. Description: Pyrethroid Pesticide

B. Source: FMC Corporation, 97.8% active ingredient

C. FMC Number: 54800

D. Reference Number: E6788:143

V. Solvents: Acetone

A. Concentration in stock solution (%): 99.8%

B. Maximum exposure concentration (ml/L): 0.0055ml acetone/L

C. Description: Liquid in a 1 gallon container

D. Source: Baxter

E. Lot number: B1511
Case Number: 67-64-1

VI. Water Quality

		Auxiliary Data Summary					
Conc-%	Parameter	Mean	Min	Max	SD	CV%	N
D-Control	Cond	383.33	364.00	422.00	21.19	1.20	6
B-Control		396.55	364.00	473.00	37.74	1.55	11
0.56		382.83	361.00	460.00	38.02	1.61	6
1.09		374.83	361.00	401.00	14.93	1.03	6
2.4		382.83	360.00	438.00	28.38	1.39	6
5.1		378.00	359.00	423.00	23.83	1.29	6
7.4		377.20	353.00	424.00	28.17	1.41	5
9.18		377.20	355.00	411.00	23.50	1.29	5
D-Control	Temp C	24.20	24.00	24.50	0.21	1.89	6
B-Control		24.16	24.00	24.50	0.17	1.70	11
0.56		24.12	24.00	24.40	0.16	1.66	6
1.09		24.07	24.00	24.20	0.10	1.34	6
2.4		24.13	24.00	24.40	0.15	1.61	6
5.1		24.20	24.00	24.50	0.18	1.75	6
7.4		24.06	24.00	24.30	0.13	1.52	5
9.18		24.10	24.00	24.30	0.12	1.45	5
D-Control	pH	8.17	8.02	8.26	0.09	3.58	6
B-Control		8.22	8.06	8.33	0.08	3.38	11
0.56		8.24	8.13	8.34	0.09	3.70	6
1.09		8.25	8.14	8.35	0.08	3.33	6
2.4		8.31	8.23	8.39	0.05	2.77	6
5.1		8.27	8.10	8.38	0.12	4.26	6
7.4		8.31	8.14	8.41	0.10	3.89	5
9.18		8.34	8.23	8.41	0.07	3.09	5
D-Control	DO mg/L	7.80	7.36	8.14	0.34	7.45	6
B-Control		7.73	7.20	8.23	0.36	7.74	11
0.56		7.68	7.14	8.20	0.38	8.05	6
1.09		7.57	7.06	8.33	0.44	8.77	6
2.4		7.60	6.65	8.26	0.53	9.60	6
5.1		7.65	6.91	8.23	0.45	8.76	6
7.4		7.74	7.26	8.28	0.38	7.94	5
9.18		7.86	7.60	8.29	0.26	6.44	5
D-Control	Alkalinity mg/L	173.00	172.00	174.00	1.41	0.69	2
B-Control		171.00	170.00	172.00	1.41	0.70	2
0.56		177.00	176.00	178.00	1.41	0.67	2
1.09		178.00	178.00	178.00	0.00	0.00	2
2.4		177.00	176.00	178.00	1.41	0.67	2
5.1		179.00	178.00	180.00	1.41	0.66	2
7.4		181.00	180.00	182.00	1.41	0.66	2
9.18		180.00	180.00	180.00	0.00	0.00	2
D-Control	Hardness mg/L	156.00	154.00	158.00	2.83	1.08	2
B-Control		150.00	150.00	150.00	0.00	0.00	2
0.56		157.00	156.00	158.00	1.41	0.76	2
1.09		158.00	158.00	158.00	0.00	0.00	2
2.4		157.00	156.00	158.00	1.41	0.76	2
5.1		160.00	160.00	160.00	0.00	0.00	2
7.4		160.00	160.00	160.00	0.00	0.00	2
9.18		161.00	160.00	162.00	1.41	0.74	2

VII. Stock Solution Confirmation

Toxicant		
Nominal ppb	Actual ppb	Recovery (%)
5	9.18	184

VIII. Test Organism

A. Scientific name: *Pimephales promelas*

B. Common name: Fathead minnows

C. Dry weight (g):

Group	Foil (g)	Fish+Foil Dry (g)	Fish WGT Dry (g)	Fish Survived
Pre-Test Control A	0.0382	0.0429	0.0047	10
Pre-Test Control B	0.0422	0.0461	0.0039	9
Pre-Test Control C	0.0352	0.0400	0.0048	10
Pre-Test Control D	0.0357	0.0409	0.0052	10

D. Standard Length (mm): N/A
Cepholothorax length (mm): N/A

E. Age (days/hours): Hatched 6/27/00, Test age 8 days

F. Life stage: fry

G. Source: Aquatic Resources

H. History: Aquatic Resources hatched the fry. Aquatic Resources cultured the fry 1-2 days before delivering the fry to Aquatic Toxicology Laboratory via UPS. The fry were then acclimated in a holding tank at 25°C in the Aquatic Toxicology Laboratory's culture room.

I. Disease treatment: N/A

J. Food: Artemia Brine Shrimp

IX. Experimental Design

A. Toxicant delivery (static or metering system and flow rate): Static test with 48 hour renewal

Toxflow (ml/min): N/A
Dilflow (L/min): N/A

B. Loading (g/l) or (g/l/d): 250 ml of toxicant was poured into the test chambers. The fry were concentrated in the culture tank by a net. The fry were then collected one at a time and placed into a 30-ml plastic holding cup, 5 fry per cup. The fry were recounted in each cup before loading into test chambers. 2 cups (10 fry) were loaded into each test chambers. Each chamber was recounted to verify 10 fry per chamber.

C. Test vessel description (volume and size): Pyrex® 1 liter cups with 250 ml of test solution.

D. Test organisms per vessel: 10

E. Vessels per concentration: 4

F. Test organisms per concentration: 40

G. Photo period: 16 hours light, 8 hours dark

H. Description of monitoring (biological and chemical): Water quality was checked daily for: conductivity, temperature, pH and dissolved oxygen. Alkalinity, total hardness and toxicant concentrations were checked on day 0 and day 2 in water.

I. Description of loading procedures (stratified random design): The fry were collected from a holding tank and placed into small cups for transporting from the culturing room to the chem-room. The fry were then randomly selected and loaded into test chambers. Computerized random numbers were used to decide the test chambers location in the environmental chamber.

J. Description of biological measurements: Test chambers were checked daily for mortality. Dead organisms were removed.

K. Aeration: None

X. Toxicant Results Adjusted concentrations from Nominal to Actual (ppb)

Nominal Concentration	Day 0	Actual Concentration Day0 divided by .92	Day 2	Actual Concentration Day2 divided by 1.03	Mean Concentration
Control D	<RL	-	<RL	-	<RL
Acetone CT	<RL	-	<RL	-	<RL
0.3	0.56	0.62	0.52	0.50	0.56
0.6	1.01	1.09	1.01	1.09	1.09
1.25	2.15	2.32	2.55	2.47	2.40
2.5	4.50	4.86	4.95	5.35	5.10
3.75	6.72	7.26	6.98	7.54	7.40
5	8.31	9.14	9.50	9.22	9.18
Working Stock Solution					
Nominal Concentration	Day 0	Actual Concentration Divided by .90	Day 2	Actual Concentration Divided by 1.03	Mean Concentration
10,000	10,500	11,550	7,100	6,887	9,219

Reporting limit 0.02

A. Toxicant recovery (actual $\bar{x}$ v.s. nominal): (5.10 ppb / 2.5 ppb)*100 measured concentration was 204% of expected.

B.. Exposure variability: CV ranged from 0-14.09%
Spike recovery: 90%, 92% and 103% with a mean of 95%.

C. Biological measurements

Concentration (ppb)		Exposed	Responded	Survived
Nominal	Actual	No.	No.	(%)
0.3	0.56	40	7	83
0.6	1.09	40	40	0*
1.25	2.40	40	40	0*
2.5	5.10	40	40	0*
3.75	7.40	40	40	0*
5	9.18	40	40	0*
Control B acetone	0	40	0	100
Control D ATL	0	40	1	98

* Indicate X^2 significance ($p>0.05$) from control

D. Biological effect levels (ppb)

A. LC50 (95% CI): 0.7 (0.53-0.85) ppb based on linear interpolation method.

B. NOEC 0.56 ppb based on survival parameters.

C. LOEC 1.09 ppb based on survival parameters.

XI. Discussion

A. Unusual about test: no unusual observations

B. Deviations from procedures: none

C. Other relevant information: Dissipation rate of Bifenthrin
No dissipation was seen
Ratio of Dissipation (1.09-1.14)/1.09 = 0.05

Water Quality: fell within normal parameters

SOL v.s. DW controls: Acetone solvent control (control B) v.s. control D water fell within normal parameters.

Exposure Levels: Nominal: 0.3 ppb - 5ppb of Bifenthrin
Actual: 0.56 ppb - 9.18 ppb of Bifenthrin

Reloading: N/A

PESTICIDE INVESTIGATIONS UNIT
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